Attachment B

ANIMAS-LA PLATA PROJECT

RIDGES BASIN DAM AND RESERVOIR
PRE-CONSTRUCTION FACILITIES RELOCATIONS

DRAFT
BIOLOGICAL ASSESSMENT

APRIL 2002

TABLE OF CONTENTS

BIOLOGICAL ASSESSMENT
RIDGES BASIN DAM AND RESERVOIR
PRE-CONSTRUCTION FACILITIES RELOCATIONS

Page

1 INTRODUCTION B-1
1.1 Background B-1
1.2 History of Section 7 Consultation B-1

2 PROPOSED ACTION B-2
2.1 New Pipeline Construction Proposed B-3
2.2 Disposition of Existing Pipeline B-3
2.3 Pipeline Product Conversion B-4

3 SPECIES ACCOUNTS B-4
3.1 Colorado Pikeminnow B-4
3.1.1 Status and Critical Habitat B-4
3.1.2 Distribution B-5
3.1.3 Proximity to Project Area B-7
3.2 Razorback Sucker B-7
3.2.1 Status and Critical Habitat B-7
3.2.2 Distribution B-8
3.2.3 Proximity to Project Area B-9
3.3 Bald Eagle B-9
3.3.1 Status and Critical Habitat B-9
3.3.2 Distribution B-10
3.3.3 Proximity to Project Area B-10

4 BIOLOGICAL ASSESSMENT B-10
4.1 Potential Effects of the Proposed Action B-10
4.1.1 Colorado Pikeminnow B-11
4.1.2 Razorback Sucker B-11
4.1.3 Bald Eagle B-12
4.2 Conservation Measures B-15
4.3 Conclusion B-16

LITERATURE CITED B-18

TABLE OF CONTENTS (Continued)

BIOLOGICAL ASSESSMENT
RIDGES BASIN DAM AND RESERVOIR
PRE-CONSTRUCTION FACILITIES RELOCATIONS

Page

LIST OF TABLES

B-1 Federally Listed and Candidate Species B-1
B-2 Threshold Volume for Acute Toxicity for Aromatics and Acute and Chronic Toxicity for Benzene..... B-14
B-3 Acute Toxicity of Aromatic Hydrocarbons to Freshwater Organisms B-17

BIOLOGICAL ASSESSMENT
RIDGES BASIN DAM AND RESERVOIR
PRE-CONSTRUCTION FACILITIES RELOCATIONS

1. INTRODUCTION

1.1 Background

This Biological Assessment (BA) was prepared pursuant to Section 7 of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et seq*.), to address project impacts to threatened species and endangered species and, where applicable, their designated critical habitat. This BA addresses the potential effects of the proposed relocation of three pipelines to allow the construction of Ridges Basin Dam and Reservoir, part of the Animas-La Plata (ALP) Project proposed by the U. S. Department of the Interior (Interior), Bureau of Reclamation (Reclamation). The ALP Project has been the subject of previous National Environmental Policy Act (NEPA) compliance and analyses, the most recent being the Final Supplemental Environmental Impact Statement (FSEIS) in July 2000. Endangered Species Act compliance was established through a BA for that project (Reclamation 1999) with a Final Biological Opinion rendered by the U. S. Fish & Wildlife Service (FWS) in June 2000 (FWS 2000). The FSEIS addresses all water depletions and actions associated with the ALP Project. This BA addresses relocation of the pipelines in Ridges Basin, the proposed site of Ridges Basin Reservoir.

1.2 History of Section 7 Consultation

The Final Biological Opinion for the Animas-La Plata Project addressed effects to the Southwestern willow flycatcher (*Empidonax traillii extimus*), Mexican spotted owl (*Strix occidentalis lucida*), black-footed ferret (*Mustela nigripes*), Canada lynx (*Lynx canadensis*), mountain plover (*Charadrius montanus*), Mancos milk-vetch (*Astragalus humillimus*), Mesa Verde cactus (*Sclerocactus mesae-verdae*), Knowlton's cactus (*Pediocactus knowltonii*), boreal toad (*Bufo boreas boreas*), Sleeping Ute milk-vetch (*Astragalus tortipes*), Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), and bald eagle (*Haliaeetus leucocephalus*).

The pipeline relocation project addressed in this Biological Assessment is expected to potentially affect only the Colorado pikeminnow, razorback sucker, and bald eagle. The Gunnison sage grouse (*Cenytocercus minimus*) and yellow-billed cuckoo (*Coccyzus americanus*) were identified by the FWS as candidate species in the species list provided for this project, and are also considered in this Biological Assessment (see Table B-1).

TABLE B-1

Federally Listed and Candidate Species
ALP Pipeline Relocation Project

Federally Listed Species	Bald Eagle	*Haliaeetus leucocephalus*
Federally Listed Species	Razorback sucker	*Xyrauchen texanus*
Federally Listed Species	Colorado pikeminnow	*Ptychocheilus lucius*
Federally Listed Species	Southwestern willow flycatcher	*Empidonax traillii extimus*
Federal Candidate Species	Gunnison sage grouse	*Cenytocercus minimus*
Federal Candidate Species	Yellow-billed cuckoo	*Coccyzus americanus*

The FWS concluded in the Final Biological Opinion that the ALP Project is not likely to jeopardize the continued existence of the Colorado pikeminnow or razorback sucker, and the proposed project is not likely to destroy or adversely modify designated critical habitat. The FWS also concluded that the ALP project is not likely to jeopardize the continued existence of the bald eagle. This conclusion was based on the description of the proposed action with full implementation of the eight conservation measures described in the Biological Opinion. The eight conservation measures are summarized as follows:

1. Reclamation would commit to operate Navajo Reservoir to mimic the natural hydrograph of the San Juan River to benefit endangered fishes and their critical habitat.

2. Reclamation would be responsible for maintaining a hydrology model and its data for the San Juan River and the Animas-La Plata Project.

3. The Memorandum of Understanding and Supplemental Agreement to protect the releases for endangered fishes in the San Juan River signed in October 1991 remains in effect.

4. The Durango Pumping Plant would be operated in a manner that insures that its operations do not interfere with meeting the target flows recommended for the San Juan River.

5. Reclamation would implement all actions necessary to prevent escapement of nonnative fishes from Ridges Basin Reservoir in any water leaving the reservoir.

6. Reclamation would develop and implement a monitoring program for potential adverse bioaccumulation of trace elements in bald eagle food items in Ridges Basin Reservoir.

7. Reclamation would incorporate bypass flows into ALP project operations to promote natural recruitment of cottonwood trees along the Animas River.

8. All electrical transmission lines associated with the project would be designed to avoid injury to raptors, including bald eagles.

Reclamation is currently in the process of implementing the conservation measures identified in the Final Biological Opinion. Conservation measure 6 is the only measure that applies directly to the pipeline relocation project. This monitoring program for trace elements would be expanded and incorporated into the pipeline project mitigation as a means of monitoring potential release of toxic substances from the pipelines.

2. PROPOSED ACTION

Reclamation has developed a seven-year construction schedule for the ALP Project, with completion of Ridges Basin Dam during Fiscal Year (FY) 2007 and initiation of filling of Ridges Basin Reservoir in FY2008. Federal funding for the first project year, FY2002, has been received by Reclamation. Construction activities in the form of planning and design have begun, but before construction can begin on the dam foundation, Reclamation has requested relocation of pipelines that currently run through Ridges Basin. Pipeline facilities within the dam site area must be relocated to a different area and then the old pipelines removed and/or abandoned no later than August 2003 in order that Reclamation's construction schedule for the dam and reservoir be met.

The three pipelines include: (1) a 26-inch-diameter natural gas transmission pipeline owned and operated by Northwest Pipeline Company (Northwest); (2) a 16-inch-diameter Mid-America Pipeline Company

(MAPCO) Natural Gas Liquids (NGL) pipeline; and (3) a 10-inch-diameter MAPCO NGL pipeline. The two MAPCO pipelines parallel the Northwest pipeline route through Ridges Basin. Both Northwest and MAPCO are subsidiaries of Williams.

The portion of Northwest's 26-inch-diameter natural gas pipeline to be relocated is part of Northwest's existing Ignacio-to-Sumas natural gas transportation system. The portion of MAPCO's 10-inch and 16-inch-diameter pipelines to be relocated are a part of MAPCO's existing Rocky Mountain NGL transportation system, which transports NGLs from natural gas production areas in the Rockies to markets in the mid-continent and Gulf coast regions. Northwest and MAPCO propose to abandon a total of 14.91 miles (4.97 miles for each of three pipelines) of existing pipelines within Ridges Basin, of which a total of 13.11 miles (4.37 miles for each of the three pipelines) could be abandoned in place and a total of 1.8 miles (0.6 mile for each of the three pipelines) removed. Portions of the pipelines to be removed lie under the proposed Ridges Basin Dam and outlet works. The sections of pipelines to be relocated are situated approximately 2 miles southwest of Durango, Colorado.

2.1 New Pipeline Construction Proposed

Northwest and MAPCO propose to construct a total of approximately 12.9 to 20.7 miles of new pipeline (4.3 to 6.9 miles for each of three new pipelines) to replace their existing pipeline facilities through Ridges Basin depending on the route selected (the difference in length reflects two pipeline alternate routes considered). In order to maintain service to its customers, the new pipelines must be installed and connected to the respective systems before the existing pipelines can be taken out of service. The replacement pipelines would not increase the capacity of any of the three pipeline systems.

The Northwest pipeline would be installed in a permanent right-of-way 75 feet wide. Additional space, up to 40 feet, may be required in places where greater access is needed during construction.

The two new MAPCO pipelines would be constructed parallel to the Northwest pipeline in an adjacent 75-foot permanent right-of-way. Additional space, up to 40 feet, may be required in places where greater access is needed during construction. The MAPCO pipelines would be separated 20 feet from each other and 20 feet from the Northwest line for the entire route, except for approximately 3,507 feet of Horizontal Directional Drill (HDD) boring plus transition areas (northern route only).

2.2 Disposition of Existing Pipelines

When the new Northwest and MAPCO pipelines are completed and tied-in, the corresponding 14.91 miles of existing pipelines would be abandoned. Approximately 13.11 miles of pipeline (4.37 miles for each of three pipelines) could be abandoned in place. About 1.8 miles of pipeline (consisting of 0.6 miles each of three pipelines) would be excavated and removed. After tie-in to the relocated pipelines is accomplished, the sections of existing pipelines to be abandoned would be cleaned to remove any residual liquids. The residual liquids would be captured and disposed of in accordance with appropriate environmental regulations. Prior to filling of the reservoir, the portions of the pipelines that are abandoned in place would be capped and filled with water to prevent buoyancy.

When Reclamation begins construction of the dam, additional sections of pipe would be removed as necessary for excavation of the dam foundation and borrow areas and construction of the coffer dam and diversion channel.

Several sections of Northwest's existing pipeline in the Ridges Basin area are coated with asbestos felt wrap. Appropriate abatement and disposal techniques would be used along any section of pipe coated with asbestos felt wrap that is removed from the trench. None of the existing pipeline that could be

abandoned in place is coated with this material. No asbestos is present in either of the MAPCO pipeline coatings.

2.3 Pipeline Product Conversion

MAPCO proposes to convert the product carried in their 10-inch-diameter pipeline from NGL to petroleum product. The potential for releases of petroleum product and possible impacts are addressed in Chapter 3 of the attached Environmental Assessment (EA) and as Attachment A.

3. SPECIES ACCOUNTS

This section of the report addresses potential effects of the pipeline relocation project on federally listed threatened and endangered species. This assessment is provided to the FWS, as required under section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.). Listed species include two endangered fishes, the Colorado pikeminnow and razorback sucker, and two birds, including the threatened bald eagle and the endangered southwestern willow flycatcher. The Gunnison sage grouse and yellow-billed cuckoo are federal candidate species (see table B-1).

Neither the northern or southern pipeline alternative would affect habitat for the southwestern willow flycatcher, Gunnison sage grouse, or yellow-billed cuckoo. Habitat for these species, except for the southwestern willow flycatcher, is not present in the project area. Habitat for the southwestern willow flycatcher may be found in the project area but it would not be impacted by the project. Colorado pikeminnow and razorback sucker are found in the San Juan River downstream of the project area.

The Gunnison sage grouse, with their habitat preference for sagebrush vegetation, are restricted to eight isolated populations in Colorado (areas to the northwest, north, and northeast of the project area) and Utah; total population is less than 5,000. Some populations are small, fewer than 150 breeding birds, and several former populations have become extirpated since 1980. Neither the Ridges Basin area nor La Plata County is within the distributional area of the isolated populations of the species. Suitable sagebrush vegetation cover does not exist in the project area. It is unlikely that the Gunnison sage grouse occurs or would occur in the project area, and the proposed pipeline construction or operation would not affect this species.

The yellow-billed cuckoo is an obligate, riparian species that prefers dense, mature stands of cottonwoods and other large riparian-associated trees. Nesting sites have been reported south of the pipeline relocation project area. However, riparian vegetation characteristic of the structural and species component defining suitable yellow-billed cuckoo habitat is not present in the Ridges Basin project area, and cuckoos have not been observed in the area. There are few riparian trees located in the project portions of Basin Creek or Wildcat Creek, and this fragmented habitat is not conducive to yellow-billed cuckoo. Such suitable habitat, however, could occur in the mature cottonwood stands along the Animas River or portions of Lightner Creek. These areas would not be affected by the proposed project. It is unlikely that the yellow-billed cuckoo occurs or would occur in the project area, and the proposed pipeline construction or operation would not affect this species.

3.1 Colorado Pikeminnow

3.1.1 Status and Critical Habitat

The Colorado pikeminnow is a cyprinid fish species endemic to the Colorado River Basin. The species was once distributed throughout the major rivers and tributaries of the basin in Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, and California (Jordan 1891; Tyus 1991). This species is the

largest cyprinid native to North America. The American Fisheries Society changed the common name for the Colorado squawfish to Colorado pikeminnow in 1998 (Nelson et al. 1998). Adults attain a maximum size of about 1.8 meters (m) total length (TL) and weigh 36 kilograms (kg) (Miller 1961). Life history of the Colorado pikeminnow was summarized by Tyus (1991).

The Colorado pikeminnow is currently listed as *"endangered"* under the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et. seq.*). It was first included in the List of Endangered Species issued by the Office of Endangered Species on March 11, 1967 (32 FR 4001) and was considered endangered under provisions of the Endangered Species Conservation Act of 1969 (16 U.S.C. 668aa). The Colorado squawfish (pikeminnow) was included in the United States List of Endangered Native Fish and Wildlife issued on June 4, 1973 (38 FR No. 106; i.e., the "red book"), and it received protection as endangered under Section 4(c)(3) of the original ESA of 1973. The latest revised Colorado Squawfish (pikeminnow) Recovery Plan was approved on August 6, 1991 (FWS 1991), and critical habitat was designated on March 21, 1994 (59 FR 13374).

A total of 1,148 miles (1,848 kilometers (km)) of critical habitat have been designated for the Colorado pikeminnow in the Upper Colorado River Basin. There is no critical habitat designated in the Lower Basin. Designated critical habitat includes the following reaches of river, including the 100-year flood plain:

- Yampa River from State Highway 394 bridge (near Craig, Colorado) downstream to confluence with Green River.
- Green River from confluence with Yampa River downstream to confluence with Colorado River.
- White River from Rio Blanco Lake Dam downstream to confluence with Green River.
- Gunnison River from confluence with Uncompahgre River (near Delta, Colorado) downstream to confluence with Colorado River (near Grand Junction, Colorado).
- Colorado River from Colorado River bridge at exit 90 north off Interstate 70 (near Palisade, Colorado) downstream to North Wash, including Dirty Devil arm of Lake Powell.
- San Juan River from State Route (SR)371 bridge (near Farmington, New Mexico) downstream to Neskahai Canyon in the San Juan arm of Lake Powell.

3.1.2 Distribution

Wild populations or individuals of Colorado pikeminnow are presently found in about 1,753 km of riverine habitat in the Green River, upper Colorado River, and San Juan River subbasins; this represents about 29 percent of estimated historic habitat (59 FR 13374). Currently occupied habitat occurs in the Green River from Lodore Canyon to the confluence of the Colorado River (Tyus 1991; Bestgen and Crist 2000); the Yampa River downstream of Craig, Colorado (Tyus and Haines 1991); the Little Snake River from its confluence with the Yampa River upstream into Wyoming (Marsh et al. 1991; Wick et al. 1991); the White River downstream of Taylor Draw Dam and Kenney Reservoir (Tyus and Haines 1991); the lower 143 km of the Price River (Cavalli 1999); the lower Duchesne River; the upper Colorado River from Palisade, Colorado, to Lake Powell (Valdez et al. 1982a; Osmundson et al. 1997, 1998); the lower 64 km of the Gunnison River (Valdez et al. 1982b; Burdick 1995); the lower 10 km of the Dolores River (Valdez et al. 1992); and 241 km of the San Juan River downstream from Shiprock, New Mexico, to the

Lake Powell inflow (Jordan 1891; Koster 1960; Olson 1962; Holden 1999; Propst 1999).

Natural reproduction of Colorado pikeminnow is currently known from the Green, Yampa, upper Colorado, Gunnison, and San Juan Rivers. The number of wild Colorado pikeminnow in the San Juan River subbasin is considerably lower than in the Upper Colorado River or Green River subbasins; only 17 wild adults and 2 juveniles were captured in the entire San Juan River between 1991 and 1995. Fifteen sampling trips were conducted between June 1991 and October 1995 (three trips per calendar year) from river mile (RM) 136.6 (Stump Camp) to RM 119.2 (Four Corner's Bridge). The 17.4-mile reach was the only common section of the San Juan River sampled during all 15 trips, and only 15 adult Colorado pikeminnow were captured in this reach. Radiotelemetry confirmed that these 15 fish were year-round residents of this river section. Of the 15 fish captured, 9 were recaptured (3 were recaptured twice).

A population estimate for fish captured and recaptured between 1991 and 1995 derived a total of 19 adult fish (95 percent confidence intervals = 10–42). It is estimated that there were probably fewer than 40 wild adult Colorado pikeminnow in the entire San Juan River as of October 1995 (Personal Communication, Dale Ryden, FWS). Only three wild Colorado pikeminnow were captured in the San Juan River between 1995 and 2001; 2 juveniles (363 and 432 millimeters (mm) TL) near Lake Powell in 1996; 1 adult originally captured in April 1993, recaptured in 1998, 1999, and 2000 (all from RM 136.6 to RM 119.2). Radio-telemetry studies indicate that the fish were able to ascend the Cudei Diversion, but present upstream extension of wild fish in the San Juan River is the Hogback Diversion at RM 158.6 (Ryden and Pfeifer 1998; Ryden 2000a). The Hogback Diversion has now been rebuilt, however, and includes a fish ladder, so this may change in the future.

Fifty adult Colorado pikeminnow were stocked in the San Juan River in October 1997. Fifteen of these fish were implanted with radio-transmitters and monitored for habitat use through 1998; the fish showed little movement from areas of release. Drift studies showed that young Colorado pikeminnow are found only in the lower river reaches and the high water zone of Lake Powell. Over 300,000 hatchery-produced Colorado pikeminnow have been released in the San Juan River since 1996 (Ryden and Ahlm 1996; Holden 1999; personal communication, F.Pfeifer, FWS). Some of these fish survived, and recent discoveries of young fish in the system may be attributed to reproduction by the hatchery fish.

Historical information on the population of Colorado pikeminnow in the San Juan River is lacking, but anecdotal accounts suggest that the species was found in the San Juan River to present-day Navajo Dam and the lower Animas River (Koster 1960; Platania 1990). Present distribution of the species is from the San Juan arm of Lake Powell, near Piute Farms Marina (RM 0) upstream to the Hogback Diversion (RM 158.6). The Hogback Diversion formerly prevented upstream movement of this species at all flows, but has recently been rebuilt and now includes a fish ladder. The Cudei Diversion (RM 142.0) is located downstream of the Hogback Diversion, and is passable by fish during high flows and using the fish ladder. Three other diversions act as barriers to upstream fish movement; i.e., Four Corners Generating Station Diversion (RM 163.3), San Juan Generating Station Diversion (RM 166.1), and Fruitland Diversion (RM 177.2). Other than Hogback, these four diversions would have to be modified to allow Colorado pikeminnow access to upstream reaches and the Animas River (Masslich and Holden 1996).

Colorado pikeminnow in the San Juan River subbasin are separated from the Upper Colorado River and Green River subbasins by about 320 km across Lake Powell, habitat not normally inhabited by Colorado pikeminnow, but through which passage is possible. Several adults have been captured in this reservoir (Valdez 1990); most recently near Bullfrog, Utah (personal communication, W. Gustaveson, Utah Division of Wildlife Resources), a midpoint between the San Juan River and upper Colorado River, but movement of Colorado pikeminnow between these subbasins has not been documented.

3.1.3 Proximity to Project Area

Colorado pikeminnow are currently found outside of the project area, in the San Juan River. Basin Creek (drains Ridges Basin) enters the Animas River approximately 45 river miles upstream from the confluence with the San Juan River at Farmington, NM. The confluence of the Animas River is located at approximately RM 181 on the San Juan River (i.e., distance upstream from Piute Farms Marina, Lake Powell). The upstream most distribution of Colorado pikeminnow in the San Juan River is the Hogback Diversion at RM 158.6. The Hogback Diversion has now been rebuilt, however, and includes a fish ladder, so this may change in the future.

Hence, the distance from the pipeline relocation project in Basin Creek to presently occupied habitat of Colorado pikeminnow is about 67 river miles (45 miles of the Animas River plus 22.4 miles of the San Juan River).

The upper end of critical habitat for Colorado pikeminnow is SR 371 Bridge about 0.5 miles downstream of the confluence of the Animas River, near Farmington (RM 180). Hence, the distance from Basin Creek to designated critical habitat for Colorado pikeminnow is about 45 miles.

3.2 Razorback Sucker

3.2.1 Status and Critical Habitat

The razorback sucker is a large catostomid fish endemic to the Colorado River Basin (Minckley et al. 1991). The species was once distributed throughout the major rivers and tributaries of the basin in Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, and California (Jordan 1891; Minckley et al. 1991). Adults attain a maximum size of about 1 m TL and weigh 5 to 6 kg (Minckley 1973). Life history of the razorback sucker is presented by Minckley et al. (1991).

The razorback sucker is currently listed as *"endangered"* under the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et. seq.*). It was listed as endangered under a final rule published on October 23, 1991 (56 FR 54957). A recovery plan was approved on December 23, 1998 (FWS 1998), and critical habitat was designated on March 21, 1994 (59 FR 13374).

A total of 1,724 miles (2,776 km) of critical habitat have been designated for the razorback sucker in the Colorado River Basin. Designated critical habitat includes the following reaches of river, including the 100-year flood plain:

- Yampa River from mouth of Cross Mountain Canyon downstream to confluence with Green River.
- Green River from confluence with Yampa River downstream to confluence with Colorado River.
- White River from the boundary of the Uintah and Ouray Indian Reservation downstream to confluence with Green River.
- Duchesne River from river 2.5 downstream to confluence with Green River.
- Gunnison River from confluence with Uncompahgre River (near Delta, Colorado) downstream to Redlands Diversion Dam (near Grand Junction, Colorado).

- Colorado River from Colorado River bridge at exit 90 north off Interstate 70 (near Palisade, Colorado) downstream to North Wash, including Dirty Devil arm of Lake Powell.

- San Juan River from Hogback Diversion downstream to Neskahai Canyon in the San Juan arm of Lake Powell.

- Colorado River from confluence of Paria River downstream to Hoover Dam, including Lake Mead.

- Colorado River from Hoover Dam downstream to Davis Dam, including Lake Mohave.

- Colorado River from Parker Dam downstream to Imperial Dam, including Imperial Reservoir.

- Gila River from the Arizona-New Mexico border downstream to Coolidge Dam.

- Salt River from U. S. Highway 60/SR 77 bridge downstream to Roosevelt Diversion Dam.

- Verde River from U. S. Forest Service boundary (Prescott National Forest) downstream to Horseshoe Dam, including Horseshoe Lake.

3.2.2 Distribution

Historic distribution of razorback sucker in the upper basin included the Colorado, Green, and San Juan River drainages (Minckley et al. 1991; Holden 1999; Muth et al. 2000). Evidence suggests that the species was common and possibly locally abundant in the lower reaches of the Green and Colorado rivers and in the lower reaches of some tributaries (Minckley et al. 1991; Muth et al. 2000). This species was reported from the White, Duchesne, Little Snake, Yampa, and Gunnison rivers (Burdick 1995), and, although evidence is sparse and anecdotal, as far up the San Juan River drainage as the Animas River (Jordan 1891; Minckley et al. 1991; FWS 1998).

Razorback sucker are currently found in the Green River, upper Colorado River, and San Juan River subbasins; reservoirs of Lakes Mohave, Mead, and Havasu; and in small tributaries of the Gila River (Verde River, Salt River, and Fossil Creek). The fish in all populations are aged and senile adults with little or no reproduction and recruitment, except for the middle Green River and Lake Mead, where small numbers of juveniles and young adults indicate low recruitment levels (Guttermuth et al. 1994; Modde et al. 1996; Holden et al. 1999a, 1999b). Young produced by wild adults in Lake Mohave are captured and raised in protected environments then released back to the reservoir.

Hatchery-reared razorback sucker (939 individuals) were introduced into the San Juan River between March 1994 and October 1996 (Ryden 2000b). Fifty-seven of these fish were implanted with radio-transmitters to monitor habitat use and movement. The fish used primarily two river locations associated with backwater habitats (RM 38.6 and RM 77.3), and one location may be associated with spawning (RM 100.2) (Ryden 2000b). During May 1997, two larval razorback sucker were collected downstream of RM 90, representing the first successful reproduction by the species in the San Juan River.

Recently documented records of wild razorback sucker in the San Juan River are limited to two fish captured in a riverside pond near Bluff, Utah, in 1976, and one fish captured in the river in 1988, also near Bluff (Ryden 2000b). Large numbers were anecdotally reported from a drained pond near Bluff in 1976, but no specimens were preserved to verify species. No wild razorback sucker were found during the 7–year research period (1991–1997) of the San Juan River Basin Recovery Implementation Program (SJRRIP) (Holden 1999). Hatchery-reared razorback sucker, especially larger fish (> 350 mm), introduced into the San Juan River in the 1990s have survived into subsequent years and reproduced, as evidenced by recapture data and collection of larval fish (Ryden 2000b).

Razorback sucker presently have access to the San Juan River from the San Juan arm of Lake Powell, near Piute Farms Marina (RM 0) upstream to the Hogback Diversion (RM 158.6). The Hogback Diversion has recently been rebuilt and now includes a fish ladder, and no longer prevents upstream movement of fish at all flows. The Cudei Diversion (RM 142.0) is located downstream of the Hogback Diversion, and is passable by fish during high flows. Three other diversions also act as barriers to upstream fish movement; i.e., Four Corners Generating Station Diversion (RM 163.3), San Juan Generating Station Diversion (RM 166.1), Fruitland Diversion (RM 177.2). All five diversions would have to be modified to allow razorback sucker access to upstream reaches and the Animas River (Masslich and Holden 1996).

Razorback sucker in the San Juan River subbasin are separated from the Upper Colorado River and Green River subbasins by about 320 km across Lake Powell, habitat not normally inhabited by razorback sucker, but through which passage is possible. Movement of razorback sucker between the San Juan River and the Upper Colorado River and Green River subbasins has not been documented.

3.2.3 Proximity to Project Area

Razorback sucker are currently found outside of the project area, in the San Juan River. Basin Creek (drains Ridges Basin) enters the Animas River approximately 45 river miles upstream from the confluence with the San Juan River at Farmington, NM. The confluence of the Animas River is located at approximately RM 181 on the San Juan River (i.e., distance upstream from Piute Farms Marina, Lake Powell). The upstream most distribution of razorback sucker in the San Juan River is the Hogback Diversion at RM 158.6. The Hogback Diversion has now been rebuilt, however, and includes a fish ladder, so this may change in the future. The upper end of critical habitat for razorback sucker is the Hogback Diversion, and hence, the distance from Basin Creek to critical habitat of razorback sucker is about 67 river miles.

3.3 Bald Eagle

3.3.1 Status and Critical Habitat

The bald eagle is associated with aquatic ecosystems throughout its range, which formerly included most of the North American continent. Bald eagles are known to feed and roost at Lemon Reservoir and along the Animas and La Plata Rivers. The Animas and La Plata Rivers, and other stream corridors in the area are important wintering areas for bald eagles. The birds arrive in the area in mid-November and leave by late March or early April. Only a small number of bald eagles remain in the southwest each spring to nest and rear young. There are no active bald eagle nests within, or in the immediate vicinity of, the project area (Interior 1999). Two nests with a history of production are known in the Animas River drainage between Durango and the San Juan River. One is in Colorado, approximately 10 miles north of the state line; the other is in New Mexico about 1 mile south of the state line. These nests have not been reported active recently, presumably because of increased human encroachment in the area.

The bald eagle was designated as endangered in the conterminous United States (except for Washington, Oregon, Minnesota, Wisconsin, and Michigan) as part of the List of Endangered Species issued by the Office of Endangered Species on March 11, 1967 (Federal Register Volume 32(48):4001). The "southern bald eagle" received protection as an endangered species under the Endangered Species Conservation Act of 1969 (16 U.S.C. 668aa). On February 14, 1978 (Federal Register Volume 43:6230-6233), the bald eagle was affirmed as an endangered species in the conterminous United States and was also designated as threatened in Washington, Oregon, Minnesota, Wisconsin, and Michigan. Critical habitat has not been designated for this species. On July 12, 1995, the bald eagle was reclassified as threatened throughout the United States (Federal Register Volume 50(17):35999-36010). On July 16, 1999, the bald eagle was proposed for removal from the list of endangered and threatened wildlife (Federal Register Volume 64(128): 36454-36464). A rule making has not been issued on removing the bald eagle from threatened status.

3.3.2 Distribution

Bald eagles in the area of Ridges Basin are primarily a wintering population. Six years of aerial surveys have shown that the eagles use the Animas River during winter. Primary use sites include cottonwood trees along the Animas and La Plata Rivers, and occasionally along irrigation canals. Bald eagles may use Ridges Basin as a source of fish as food, once the reservoir is filled and stocked with fish.

Bald eagles are now fairly well distributed throughout most of the United States, with nesting pairs recorded in nearly all of the lower 48 states, Mexico, Canada, and Alaska. Some bald eagles may remain in their breeding habitat year round if their fishing areas do not freeze over. Those that are forced to move in search of open water may fly from inland nesting sites to nearby coastal wintering areas, or they may migrate between a northern breeding area and a southern wintering area. Traveling alone or in pairs, birds breeding in central Canada migrate south in autumn to the west-central and southwestern United States and return north in the late winter or early spring. They may or may not frequent the same nesting grounds and wintering areas each year. Young bald eagles from the population that breeds in Florida during November and December, wander north in the summer, sometimes as far as the Maritimes. Wintering eagles typically congregate in groups of a few to perhaps a thousand birds. The largest winter gathering of bald eagles on the continent is along the late-freezing Chilkat River in Alaska, where thousands of bald eagles gather from October to December to feed on salmon that have died after spawning. An annual census of wintering eagles is done in Canada and the United States in mid-January.

3.3.3 Proximity to Project Area

Bald eagles overwinter along stream corridors in the area of the project, but are not expected to occur in the immediate project area until after pipeline construction, when Ridges Basin has been filled and stocked with fish. Bald eagles are likely to use the reservoir as a feeding site for fish during winter.

4. BIOLOGICAL ASSESSMENT

4.1 Potential Effects of the Proposed Action

This Biological Assessment addresses the Ridges Basin Dam and Reservoir pre-construction facilities relocations. Effects of water depletion of the Animas River and other components of the Animas-La Plata Project are addressed in the FSEIS. This Biological Assessment evaluates the effects of the relocation of the pipelines on the endangered Colorado pikeminnow and razorback sucker, and on the threatened bald eagle.

The two MAPCO pipelines would transport NGL, light hydrocarbons that have been liquefied under pressure. These light hydrocarbons include propane, butane, pentane, or a mixture of these gases. Once released into the environment, these gases are volatilized and quickly evaporate.

MAPCO proposes to convert the product carried in their 10-inch-diameter pipeline from NGL to refined petroleum product without additives, and reverse the direction of flow. The time at which this conversion would occur is presently unknown. The potential for release of petroleum product into Ridges Basin Reservoir exists with a leak or break in the MAPCO pipeline. This Biological Assessment addresses potential effects of construction, leaks or breaks in the NGL lines, and leaks or breaks in the petroleum product line following conversion.

4.1.1 Colorado Pikeminnow

Pipeline construction activities would not affect Colorado pikeminnow, or destroy or adversely modify critical habitat. Occupied habitat and critical habitat for Colorado pikeminnow are located too far from Ridges Basin to be affected by pipeline construction activities. Occupied habitat and critical habitat are 67 miles and 45 miles, respectively, downstream from the project area. Best management practices would be used by construction crews to minimize spills of hazardous materials that could get into waterways that would lead to habitat in the San Juan River.

Operation of the NGL pipelines would not affect the Colorado pikeminnow, or destroy or adversely modify critical habitat. If a leak or break occurs, most of the NGL would volatilize and evaporate, and the remainder would become soluble and dilute in Ridges Basin Reservoir. Materials would not be expected to reach occupied or critical habitat of Colorado pikeminnow. Appropriate avoidance measures would be taken to minimize the risk of a leak or break in these lines, including pipe wall thickness and strength that equals that of the pipeline at stream crossings and in proximity of reservoirs for the Questar, Williams, and Kern River pipeline (Interior 2001).

Petroleum product spills from the 10-inch-diameter MAPCO petroleum product pipeline may affect Colorado pikeminnow, if sufficient volume of material were to reach occupied or critical habitat. If a spill occurred into Ridges Basin Reservoir, the petroleum product would be diluted by the volume of water in the reservoir, and further diluted by the volume of water in the Animas River, if the spill escaped from the reservoir. A petroleum product spill in Ridges Basin Reservoir could be contained by not allowing water releases from the reservoir. This would negate any possibility for petroleum product reaching occupied or critical habitat of Colorado pikeminnow.

If petroleum product reached the Animas River and eventually occupied or critical habitat of Colorado pikeminnow in the San Juan River, the most toxic fractions would be evaporated, including benzene, hexane, octane, and decane. The amount of residue reaching these downstream areas would be small and greatly diluted. The fraction of polycyclic aromatic hydrocarbons (PAHs), also known as polynuclear aromatic hydrocarbons (PNAs), is small in refined petroleum product, and the volume reaching occupied or critical habitat of Colorado pikeminnow is expected to be insignificant.

4.1.2 Razorback Sucker

Pipeline construction activities would not affect razorback sucker, or destroy or adversely modify critical habitat. Occupied habitat and critical habitat for razorback sucker are located too far from Ridges Basin to be affected by pipeline construction activities. Occupied habitat and critical habitat are 67 miles downstream from the project area. Best management practices would be used by construction crews to minimize spills of hazardous materials that could get into waterways that would lead to habitat in the San Juan River.

Operation of the NGL pipelines would not affect the razorback sucker. If a leak or break occurs, most of the NGL would volatilize and evaporate, and the remainder would become soluble and dilute in Ridges Basin Reservoir. Materials would not be expected to reach occupied or critical habitat of razorback sucker. Appropriate avoidance measures would be taken to minimize the risk of a leak or break in these lines, including pipe wall thickness and strength that equals that of the pipeline at stream crossings and in proximity of reservoirs for the Questar, Williams, and Kern River pipeline (Interior 2001).

Petroleum product spills from the 10-inch-diameter MAPCO petroleum product pipeline may affect razorback sucker, if sufficient volume of material were to reach occupied or critical habitat. If a spill occurred into Ridges Basin Reservoir, the petroleum product would be diluted by the volume of water in the reservoir, and further diluted by the volume of water in the Animas River, if the spill escaped into the Animas River. A petroleum product spill in Ridges Basin Reservoir could be contained by not allowing water releases from the reservoir. This would negate any possibility for petroleum product to reach occupied or critical habitat of razorback sucker.

If petroleum product reached the Animas River and eventually occupied or critical habitat of razorback sucker in the San Juan River, the most toxic fractions would be evaporated, including benzene, hexane, octane, and decane. The amount of residue reaching these downstream areas would be small and greatly diluted. The fraction of polycyclic aromatic hydrocarbons (PAHs), also known as polynuclear aromatic hydrocarbons (PNAs), is small in refined petroleum product, and the volume reaching occupied or critical habitat of razorback sucker is expected to be insignificant.

4.1.3 Bald Eagle

Bald eagles currently do not occur in the immediate project area, and construction activities associated with the relocation project would not affect the bald eagle. Bald eagles use nearby stream courses (e.g., Animas River, La Plata River) in winter, where they feed primarily on fish. These birds are likely to be attracted to Ridges Basin Reservoir during winter, once the reservoir is filled and stocked with fish. This would occur after pipeline construction. Critical habitat is not designated for bald eagles.

Operation of the NGL pipelines is not likely to affect the bald eagle. Bald eagles are expected to occur in the project area only in winter and after Ridges Basin Reservoir is filled and stocked with fish. If a leak or break occurs in winter, volatilization may be slowed by cold temperatures, but most of the material would be expected to eventually evaporate. If a spill occurred in winter, when bald eagles are present, no adverse effect is expected from ingestion of materials, either directly or through the food chain. All avoidance measures would be taken to minimize the risk of a leak or break from the three pipelines. Activities to repair the line could disturb eagles in the area of the reservoir. Appropriate measures would need to be taken to minimize this disturbance.

Conversion of the 10-inch-diameter MAPCO pipeline from NGL to petroleum product would introduce the risk of a spill to Ridges Basin Reservoir. A petroleum product spill into Ridges Basin Reservoir could affect bald eagles attracted to fish as a food source (Ridges Basin Reservoir would be managed as a recreational trout fishery). The petroleum product in the 10-inch-diameter MAPCO line would be refined product without additives. This product is composed primarily of low-molecular-weight hydrocarbons that are high volatilized and quickly evaporate; it also lacks the dense residue of crude oil. Petroleum product in the reservoir could affect bald eagles by directly soiling feathers of birds diving for fish, or through ingesting contaminated fish. Some residual is expected to become soluble in water. Bald eagles may become ill from ingesting petroleum residues on fish either caught live or found dead along the shoreline.

If a spill occurs, approximately 67; 1,815; and 744 barrels of product would be released under three probable release scenarios: (1) active leak detection lower limit of 1 percent of pipeline flow (i.e., about 32 barrels per hour (bph)), (2) complete rupture and maximum release of 3,200 bph, and (3) small leak rate of 1 bph detected after 30 days. In the case of scenarios 1 and 2, the leak or spill would be detected within 30 minutes through loss of pressure in the pipe. A small leak may only be detected by a static test. A hazardous spills clean-up team would be required as a conservation measure to respond to any spills within 1 hour, and the project proponent would be required to maintain all equipment and materials necessary for site clean up.

Two different spill scenarios were analyzed: Ridges Basin Reservoir at full capacity (120,000 acre-feet) and Ridges Basin Reservoir at minimum pool (30,000 acre-feet). These two scenarios are discussed in the following paragraphs.

At 120,000 acre-feet (full capacity), Ridges Basin Reservoir would be approximately 9,000 feet at its widest point, and 17,010 feet at its longest point. At a spread rate of 1,969 feet/h, refined petroleum would spread across the reservoir (9,000 feet) in approximately 4.5 hours, and would spread the entire length of the reservoir (17,010 feet) in approximately 8.5 hours. At a spread rate of 1,969 feet/h, the volume of water affected in the first hour after the petroleum product contacts the water is approximately 2,516 acre-feet, and the entire reservoir (120,000 acre-feet) would be affected in approximately 8.5 h.

To determine potential toxicity of a petroleum product spill, the most toxic component of the product is used. Benzene is considered the most toxic fraction of petroleum product because of the low concentration at which toxic effects occur. Benzene is selected as the key indicator for toxicity of petroleum product because other fractions are less toxic. Benzene comprises about 2.2 percent of the volume of refined petroleum product (e.g., gasoline). Acute and chronic toxicity thresholds for rainbow trout exposed to benzene are 7.4 mg/L and 1.4 mg/L, respectively (USEPA 1998). Rainbow trout would probably be used as the principal fishery for Ridges Basin Reservoir and are the most effective indicator of toxicity to aquatic organisms for this project.

For a large spill (i.e., complete rupture and release of 1,815 barrels), benzene is estimated to be acutely toxic at a water volume of up to about 0.70 acre-feet, and chronically toxic up to a water volume of 3.68 acre-feet. (see table B-2). In the case of Ridges Basin Reservoir, the greatest risk of toxicity would occur within the first hour at a spread rate of 1,969 feet/hr.

By the end of the first hour following contact of the petroleum product with water in the reservoir, the concentration of benzene from a large spill (1,677 gallons) would be about 0.002 mg/L; thereafter, the concentration of benzene would be less than 0.001 mg/L, which is far below toxicity levels (see table B-3). Hence, block values at each end of Ridges Basin would prevent release of petroleum product of sufficient magnitude to be toxic to aquatic life or bald eagles.

The worst possible case scenario for a petroleum leak or spill in Ridges Basin Reservoir would be during winter when bald eagles are likely to be present; when low air temperatures would slow evaporation of petroleum product components, such as benzene; and with the reservoir at minimum allowable pool of 30,000 acre-feet. Under this scenario, toxicity levels of benzene during a large spill (1,677 gallons), would be the same as with the full pool volume of 120,000 acre-feet; i.e., 0.002 mg/L in the first hour and 0.004 mg/L thereafter. The lower volume of Ridges Basin Reservoir would still provide sufficient dilution to eliminate toxic effects of benzene. These spill scenarios assume little or no evaporation of benzene, and so the concentrations provided would be maximum.

TABLE B-2

Threshold Volume for Acute Toxicity for Aromatics (Hexane, Octane, Decane) and Acute and Chronic Toxicity For Benzene[1]

	Large Spill (1,815 bbl)					Threshold Volume for Toxicity	
	Acute Toxicity	*Flow Rate (bbl)*	*Flow Rate (gal)*	*2.2% (gal)*	*Toxicity Multiplier*	*Gallon (gal)*	*Acre-feet (af)*
Hexane	3.9	1,815	76,230	1,677	256.41	430,015	1.32
Octane	0.37	1,815	76,230	1,677	2,702.70	4,532,595	13.91
Decane	0.028	1,815	76,230	1,677	35,714.29	59,895,000	183.81
Benzene (acute)	7.4	1,815	76,230	1,677	135.14	226,630	0.70
Benzene (chronic)	1.4	1,815	76,230	1,677	714.29	1,197,900	3.68
	Detection Limit (67 bbl)					**Threshold Volume for Toxicity**	
	Acute Toxicity	*Flow Rate (bbl)*	*Flow Rate (gal)*	*2.2% (gal)*	*Toxicity Multiplier*	*gal*	*af*
Hexane	3.9	67	2,814	62	256.41	15,874	0.05
Octane	0.37	67	2,814	62	2,702.70	167,319	0.51
Decane	0.028	67	2,814	62	35,714.29	2,211,000	6.79
Benzene (acute)	7.4	67	2,814	62	135.14	8,366	0.03
Benzene (chronic)	1.4	67	2,814	62	714.29	44,220	0.14
	Below Detection (744 bbl)					**Threshold Volume for Toxicity**	
	Acute Toxicity	*Flow Rate (bbl)*	*Flow Rate (gal)*	*2.2% (gal)*	*Toxicity Multiplier*	*gal*	*af*
Hexane	3.9	744	31,248	687	256.41	176,271	0.54
Octane	0.37	744	31,248	687	2,702.70	1,857,989	5.70
Decane	0.028	744	31,248	687	35,714.29	24,552,000	75.35
Benzene (acute)	7.4	744	31,248	687	135.14	92,899	0.29
Benzene (chronic)	1.4	744	31,248	687	714.29	491,040	1.51

[1] Toxicity for Hexane, Octane, and Decane is 48-H LC_{50} for Freshwater Cladocera, and Acute and Chronic Toxicity for Benzene is for Rainbow Trout. EPA AQUIRE Database (1998). Data Summarize Conventional Acute Toxicity Endpoints (LC_{50} and EC_{50}); Geometric Mean is Reported when Several Results were Available for a Given Species.

Petroleum product residue (i.e., heavy hydrocarbons) could persist in the reservoir with uptake into the food chain and ingestion by bald eagles. The concentration of residue in the reservoir is not expected to be high even with a large spill because of the relatively large fraction of evaporates and small fraction of residues. Conservation measures for rapid response and clean-up of spills or leaks would minimize the volume of material that could affect the environment and bald eagles.

The fraction of polycyclic aromatic hydrocarbons (PAHs), also known as polynuclear aromatic hydrocarbons (PNAs), is small in refined petroleum product. However, some residual of PAHs would be expected following a petroleum product spill. Polycyclic aromatic hydrocarbons are compounds

associated with carcinogenesis (Lee and Grant 1981). Elevated levels of PAHs have been reported in the Animas River, but the source is unknown (Wilson et al. 1995). Levels of PAH compounds have also been found in the bile of most fishes from the San Juan River, indicating high current concentrations in that system.

4.2 Conservation Measures

Reclamation has committed to a number of mitigation measures in the FSEIS to reduce or eliminate impacts from the construction of the ALP Project, including pipeline construction. Reclamation makes additional commitments in the EA (see section 5.2). The two actions below relate to ESA compliance activities and the FWS Coordination Act Report (see FSEIS, Volume 3, Appendix 7)(Reclamation 2000a) and are included in section 5.2.

1) Either alternative will require a high standard of leak detection monitoring. The Bureau of Reclamation will be expected to adopt state-of-the-art practices to ensure that the risk of exposure to aquatic resources is minimized, and that plans and staff are available to respond to and remediate threats immediately. An alignment selected that is predicted to have a greater risk to terrestrial and aquatic resources will be expected to have a more sophisticated monitoring and remediation regimen.

The potential for release of petroleum product into Ridges Basin Reservoir exists with a leak or break in the MAPCO pipeline. Reclamation would implement or have implemented the following measures that would apply to the 10-inch-diameter MAPCO petroleum products pipeline. Other than the first commitment which would apply to all pipeline construction, these would be implemented when MAPCO receives appropriate permits and clearances to convert the 10-inch-diameter pipeline from NGLs to petroleum product. The time at which this conversion would occur is presently unknown.

- Best practices would be used by crews to minimize spills of hazardous materials during construction that could get into waterways.

- Spill avoidance technology would be implemented to minimize the risk of a spill in the petroleum product line. MAPCO would use pipe for their 10-inch-diameter pipeline in the Ridges Basin area with wall thickness equivalent to that of the pipeline crossing the Animas River (0.250 inches), and with greater steel strength (stepped up from 60X to 65X). This measure is taken to minimize the risk of a leak or spill from the pipeline. Initial operation of this pipeline would transport NGLs. When conversion to petroleum product occurs, the thicker, stronger pipe would be in place as a safety assurance against spills at or near sensitive water ways.

- Appropriate technology would be implemented to minimize the volume of a spill from the petroleum product line. This technology may include motorized block valves, check values, pump stations, detection cable with satellite link, or other current technology. This technology would be implemented before petroleum product is transported through the pipeline to minimize the volume of spill as analyzed in the Environmental Assessment and Biological Assessment of this project. This technology would include an in-line inspection system, such as a SCADA monitoring system, to allow early identification of leaks as small as 1.0 bph.

- An Emergency Response Plan for operations would be developed that details measures to contain spills and prevent further dispersal. This plan would require a response team on-site within 1 hour of leak detection. This plan would include the establishment and maintenance of on-site equipment and materials needed for hazardous spills clean-up.

The plan would also describe measures and actions that would be taken to minimize, as much as possible, adverse effects of a hazardous materials spill to the environment. The plan would include provisions for portable baffles or booms to be used on land and in the reservoir to contain and impede the spread of a spill. Activities to clean a spill and repair a pipeline could disturb eagles in the area of the reservoir. Appropriate measures would be taken to minimize this disturbance.

- A petroleum product monitoring element would be incorporated into the water quality monitoring program for potential adverse bioaccumulation of trace elements in bald eagle food items in Ridges Basin Reservoir (i.e., Conservation Measure 6 of the Animas-La Plata Project FSEIS).

- Periodic surface and/or aerial inspections would be conducted along the pipeline corridor and the Ridges Basin Reservoir shoreline to provide early detection of small leaks that go undetected by small pressure loss in the pipeline.

2) Either alternative may require an inventory for the yellow-billed cuckoo or its habitat.

It is unlikely that the yellow-billed cuckoo habitat occurs or would occur in the project area, and the proposed pipeline construction or operation would not affect this species.

4.3 Conclusion

Reclamation concludes that the Ridge Basin Dam and Reservoir pre-construction facilities relocations project is not likely to adversely affect the Colorado pikeminnow and razorback sucker, or destroy or adversely modify critical habitat. Reclamation further concludes that the project may affect, but is not likely to adversely affect the bald eagle. This conclusion is based on the description of the proposed action contained in this Biological Assessment and the associated Environmental Assessment, with full implementation of stated conservation measures.

TABLE B-3

Acute Toxicity of Aromatic Hydrocarbons to Freshwater Organisms[1]

Species	Toxicity Values (LC_{50} and EC_{50} in mg/L)				
	Benzene	Toluene	Xylene	Naphthalen	Anthrace
Fish					
carp (*Cyprinus carpio*)	---	---	780	---	---
channel catfish (*Ictalurus) punctatus*)	---	240	---	---	---
clarias catfish (*Clarias* sp.)	---	26	---	---	---
Coho salmon (*Oncorhyncus) kisutch*)	---	---	---	2.6	---
fathead minnow (*Pimephales) promelas*)	---	36	25	4.9	25
Goldfish (*Carassius auratus*)	---	23	24	---	---
guppy (*Poecilia reticulata*)	---	41	---	---	---
largemouth bass (*Micropterus salmoides*)	---	---	---	0.59	---
medaka (*Oryzias* sp.)	---	54	---	---	---
mosquitofish (*Gambusia affinis*)	---	1,200	---	150	---
rainbow trout (*Oncorhyncus) mykis*)	7.4	8.9	8.2	3.4	---
zebrafish (*Therapon jarbua*)	---	25	2.0	---	---
Invertebrates					
Rotifer (*Brachionus calyciflorus*)	---	110	250	---	---
midge (*Chironomus attenuatus*)	---	---	---	15	---
midge (*Chironomus tentans*)	---	---	---	2.8	---
cladocera (*Daphnia magna*)	30	41	---	6.3	0.43
cladocera (*Daphnia pulex*)	---	---	---	9.2	---
zooplankton (*Diaptomus forbesi*)	---	450	100	68	---
amphipod (*Gammarus lacustris*)	---	---	0.35	---	---
amphipod (*Gammarus minus*)	---	---	---	3.9	---
snail (*Physa gyrina*)	---	---	---	5.0	---
insect (*Somatochloa cingulata*)	---	---	---	1.0	---
Algae					
Chlorella vulgaris	---	230	---	25	---
Microcystis aeruginosa	---	---	---	0.85	---
Nitzschia palea	---	---	---	2.8	---
Scenedesmus subspicatus	---	130	---	---	---
Selenastrum capricornutum	70	25	72	7.5	---

[1] Source: EPA AQUIRE Database (1998). Data Summarize Conventional Acute Toxicity Endpoints (LC_{50} and EC_{50}); Geometric Mean is Reported when Several Results were Available for a Given Species

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